BAB VI

KESIMPULAN DAN SARAN

6.1 Kesimpulan

Setelah dilakukan analisis dan perancangan pada struktur atas Gedung *Trans National Crime Center* Mabes Polri Jakarta, dapat diambil beberapa kesimpulan seperti yang tercantum di bawah ini.

1. Pada proses perancangan struktur terjadi perubahan desain sebanyak tiga kali dikarenakan pengecekan syarat waktu getar alami fundamental gedung disusul dengan pengecekan desain struktur betonnya. Pengecekan struktur beton berupa pemeriksaan rasio baja tulangan, gaya geser yang terjadi, dan gaya geser pada hubungan balok kolom (join).
   1) Desain pertama menggunakan dimensi sesuai estimasi awal dan didapatkan bahwa desain tidak memenuhi syarat waktu getar alami, timbul gaya geser yang melebihi gaya geser maksimum yang diijinkan pada balok, dan rasio penulangan yang melebihi rasio maksimumnnya pada balok serta kolom.
   2) Pada desain kedua dimensi kolom dibesarkan dengan tujuan mengurangi waktu getar alami. Hasil desain kedua masih belum memenuhi syarat baik dari syarat getar maupun pemeriksaan betonnya.
   3) Pada desain ketiga dimensi balok dibesarkan dengan tujuan mengurangi waktu getar alami. Hasil desain ketiga masih belum memenuhi syarat baik dari syarat getar maupun pemeriksaan betonnya.

4) Pada desain keempat ditambahkan dinding geser dengan mengembalikan ukuran kolom seperti semula tanpa mengembalikan ukuran balok karena setelah dilakukan percobaan-percobaan diawal ternyata dimensi balok dan penambahan dinding geser ternyata dapat menambah kekakuan struktur sehingga waktu getar alami dapat berkurang. Semua *balok* dan kolom sudah masuk syarat, sehingga desain ditetapkan sebagai desain untuk perancangan struktur.

2. Elemen – elemen struktur yang dirancang berupa pelat, balok, kolom, dan tangga sesuai dengan batasan masalah serta dinding geser sebagai elemen struktur tambahan. Berikut kesimpulan dari dimensi dan tulangan yang digunakan:
   1) Digunakan pelat lantai dua arah tebal 120 mm dengan tulangan pokok P10-150 untuk daerah tumpuan dan P10-150untuk daerah lapangan, serta P8-200 untuk tulangan susut.
   2) Digunakan pelat atap dua arah tebal 120 mm dengan tulangan pokok P10-250 untuk daerah tumpuan dan P10-250 untuk daerah lapangan, serta P8-200 untuk tulangan susut.
   3) Digunakan tangga tipe 1 dengan tinggi 6 meter pada lantai 1 dan 2 dengan tulangan pelat pada tumpuan D13-80 dan lapangan D13-100, serta tulangan susut P10-200.
   4) Digunakan tangga tipe 2 dengan tinggi 4 meter pada lantai 3 hingga lantai teratas dengan tulangan pelat pada tumpuan D13-200 dan lapangan D13-200, serta tulangan susut P10-200.

5) Balok bordes yang digunakan berdimensi 200 x 400 mm^2. Digunakan tulangan longitudinal 2D16 untuk tumpuan atas, tumpuan bawah, dan lapangan. Digunakan tulangan geser 2P10-150 pada tumpuan dan lapangan.
6) Balok anak yang digunakan berdimensi 300 x 600 mm^2 dengan panjang 4 meter. Digunakan tulangan longitudinal 3D22 untuk tumpuan atas, 2D22 tumpuan bawah, dan lapangan. Digunakan tulangan geser 2P12-80 pada tumpuan dan 2P10-150 pada lapangan.
7) Balok induk yang digunakan berdimensi 400 x 800 mm^2 dengan panjang 8 meter. Digunakan tulangan longitudinal 6D25 untuk tumpuan atas, 3D25 tumpuan bawah dan lapangan. Digunakan tulangan geser 4P12-100 pada tumpuan dan 2P10-250 pada lapangan.
8) Kolom yang ditinjau pada kolom lantai 2, berdimensi 900 x 900 mm^2 dengan tinggi 6 meter. Digunakan tulangan longitudinal 20D25, tulangan transversal 4D13-100 sepanjang *lo* dan 4D13-150 diluar *lo*.
9) Digunakan dinding geser dengan tebal 350 mm dan dipasang menerus dari bagian bawah struktur hingga pada ketinggian 48 meter. Digunakan tulangan dua lapis D16-140 untuk tulangan horizontal dan vertikal. Pada elemen batas digunakan sengkang 4D13-100 serta digunakan 2D13-100 pada badan penampang.

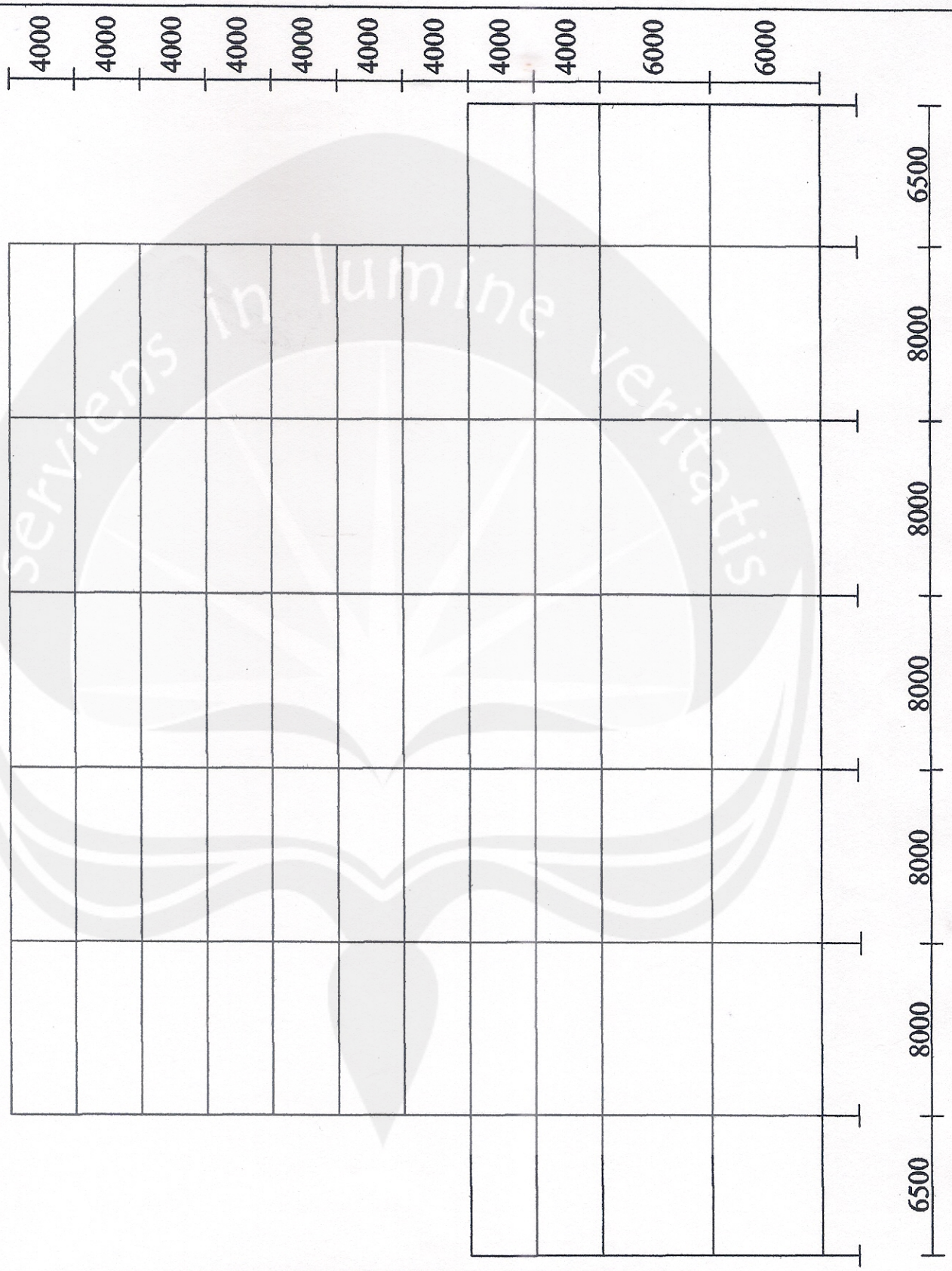
6.2 Saran

Berikut saran yang dapat diberikan penulis dari hasil penyusunan tugas akhir Perancangan Struktur Atas Gedung *Trans National Crime Center* Mabes Polri Jakarta:

1. Estimasi dimensi perlu dilakukan pertama kali dalam merencang ukuran elemen struktur dan dapat dijadikan pedoman awal untuk menentukan perubahan dimensi bila diperlukan.
2. Dalam melakukan analisis struktur dapat digunakan program bantu untuk mempercepat proses penyusunan, tetapi tidak boleh lupa prinsip – prinsip dasar hitungan dan tidak bergantung sepenuhnya pada program tersebut.
3. Aturan dan tata cara seperti SNI 03-1726-2002 dan SNI 03-2847-2002 digunakan sebagai acuan dan pedoman dalam pengerjaan tugas akhir perancangan struktur bangunan.

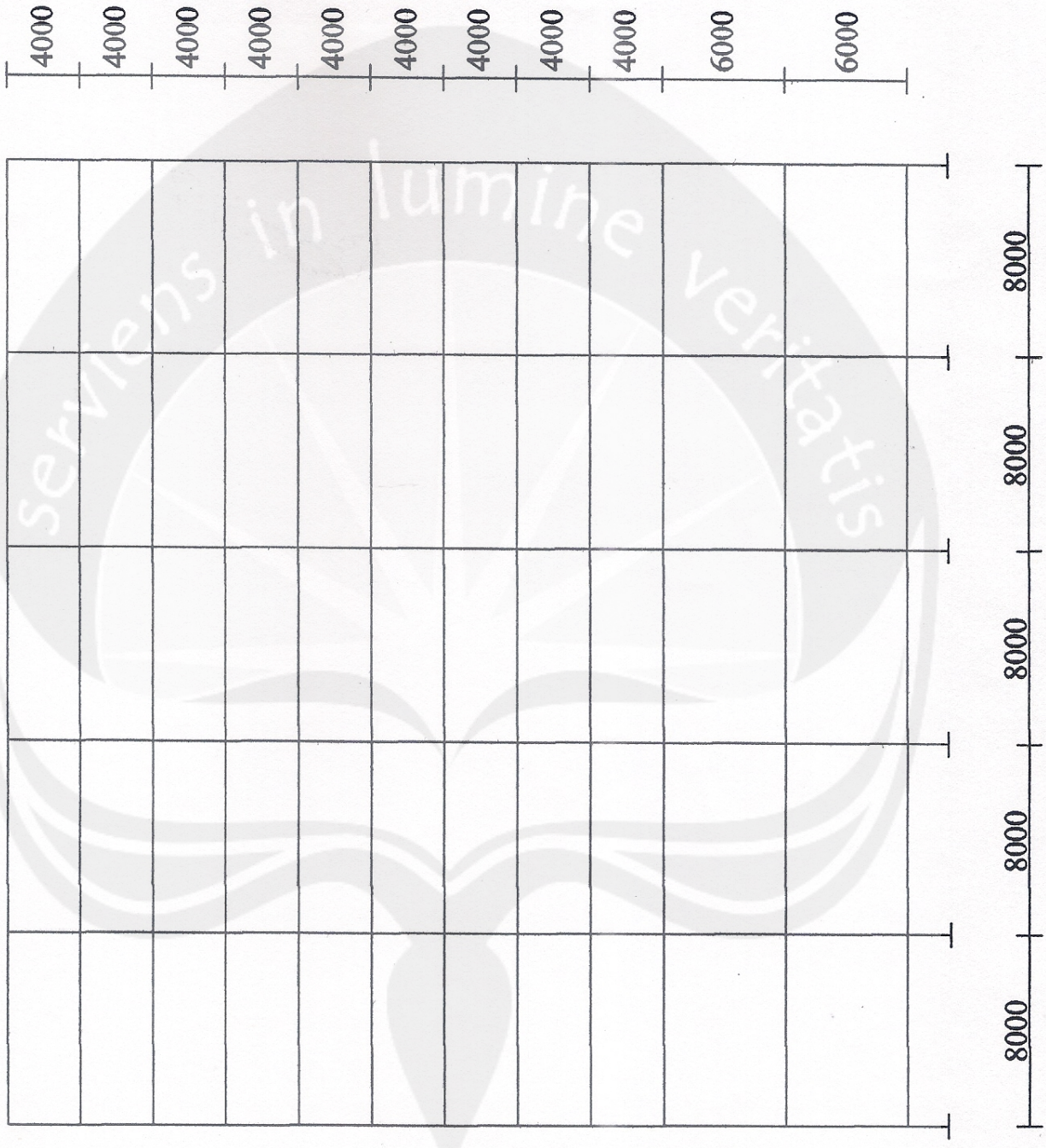
LAMPIRAN A

A.1. Gambar Denah Portal 3
A.2. Gambar Denah Portal E
A.3. Gambar Denah Lantai 1 s/d Lantai 2
A.4. Gambar Denah Lantai 3 s/d Lantai 4
A.5. Gambar Denah Lantai 5 s/d Lantai 6
A.6. Gambar Denah Lantai 7 s/d Lantai 8
A.7. Gambar Denah Lantai 9 s/d Lantai 10
A.8. Gambar Denah Lantai 11 / Atap
A.9. Gambar Penulangan Pelat Lantai
A.10. Gambar Penulangan Pelat Atap
A.11. Gambar Penulangan Tangga
A.12. Gambar Penulangan Balok Anak Empat Meter
A.13. Gambar Penulangan Balok Induk Delapan Meter
A.14. Gambar Penulangan Kolom Lt.2
A.15. Gambar Penulangan Dinding Geser

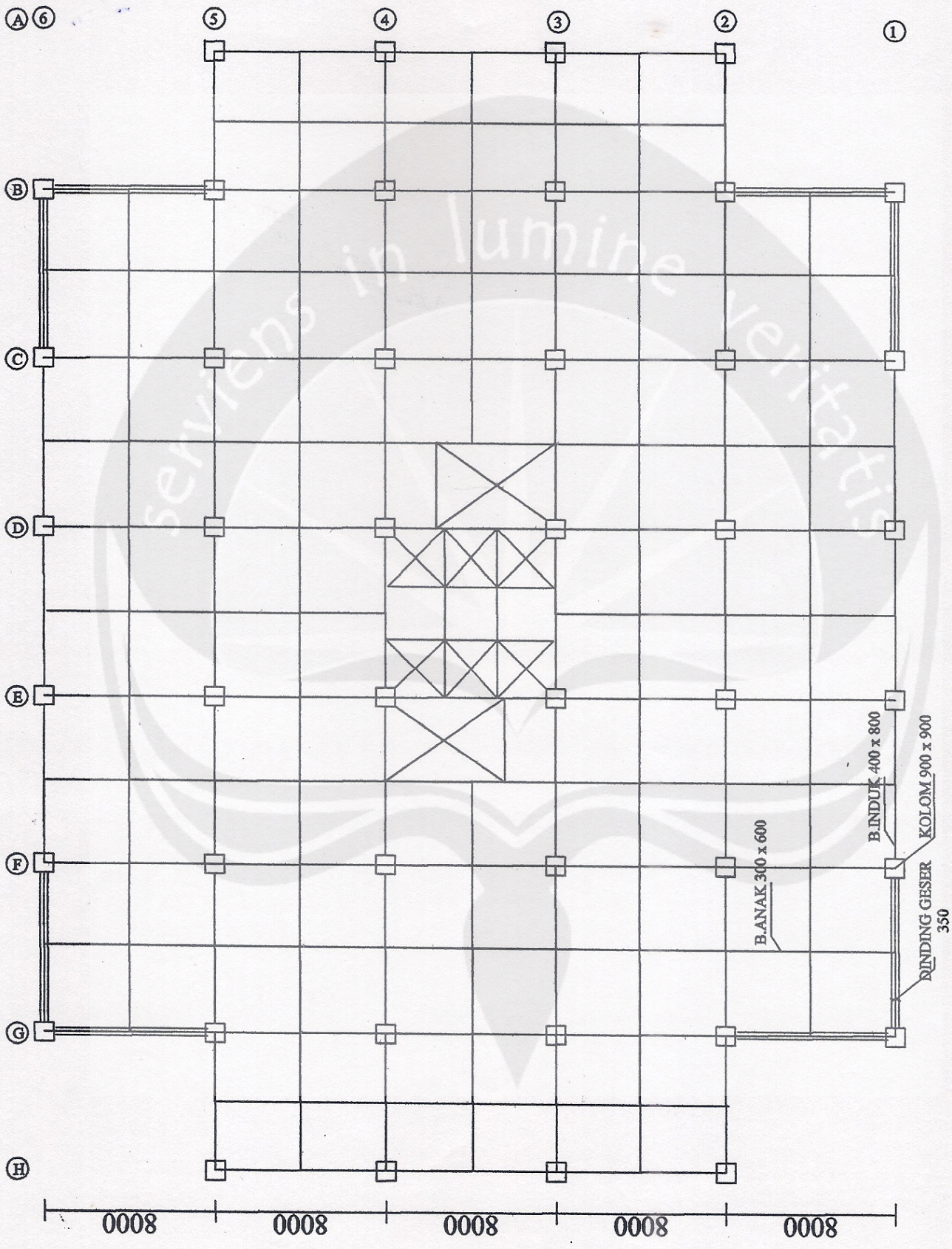


A.1. DENAH PORTAL 3(Skala 1:250)

(PT. CAKRA MANGGILINGAN JAYA)

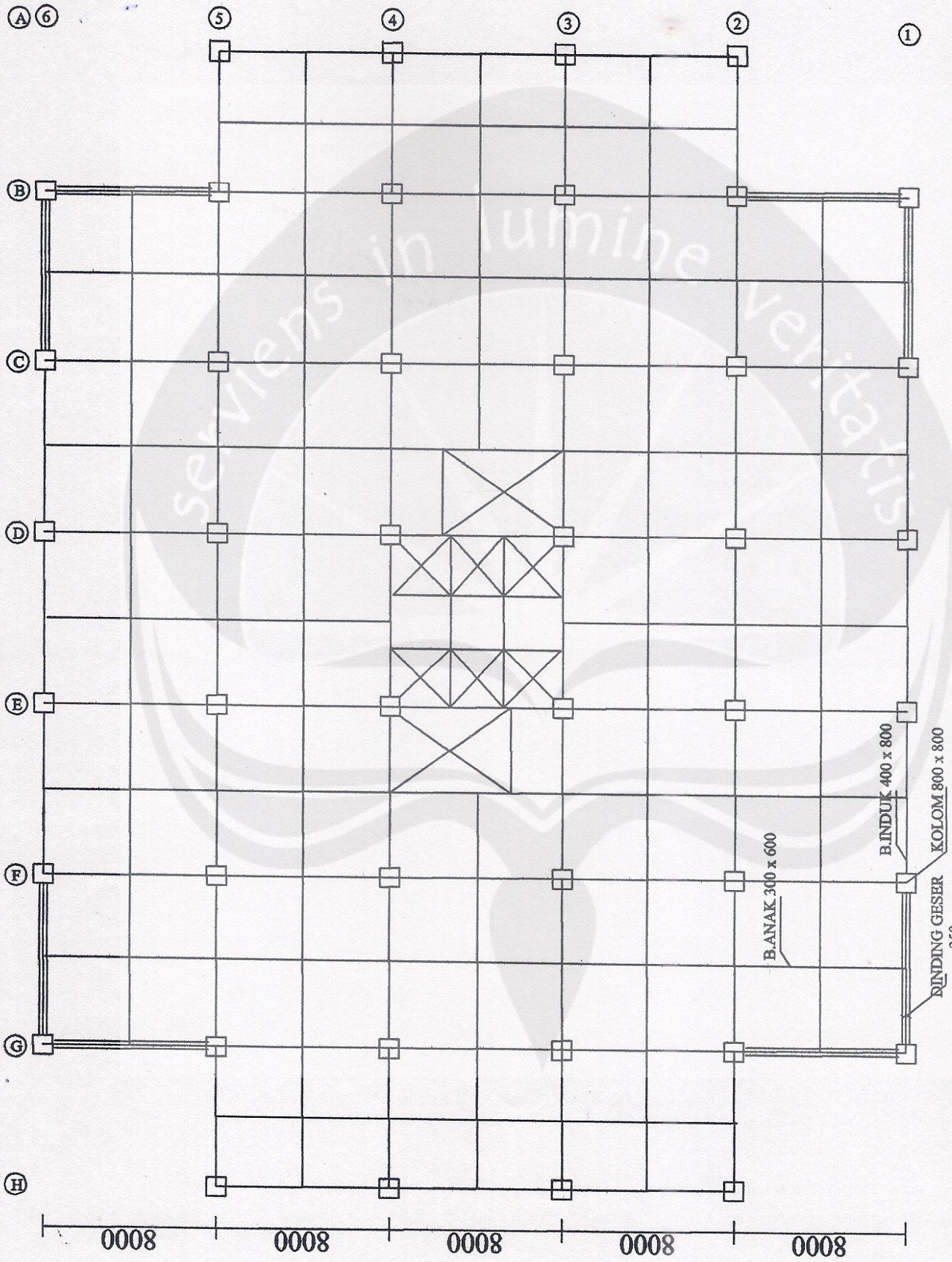


A.2. DENAH PORTAL E (Skala 1:250)
(PT. CAKRA MANGGILINGAN JAYA)



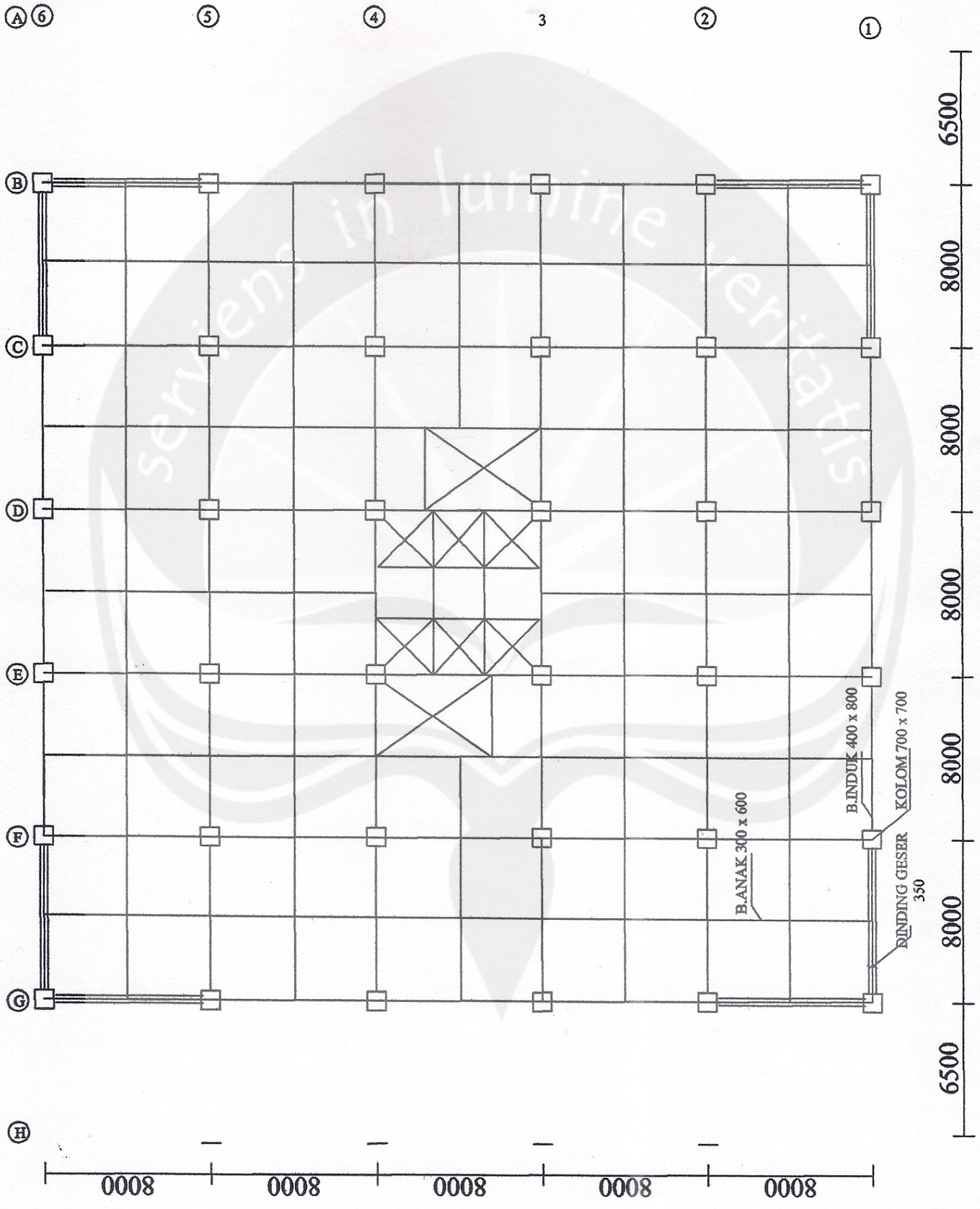
A.3. DENAH LANTAI 1 s/d LANTAI 2 (Skala 1:250)

(PT. CAKRA MANGGILINGAN JAYA)



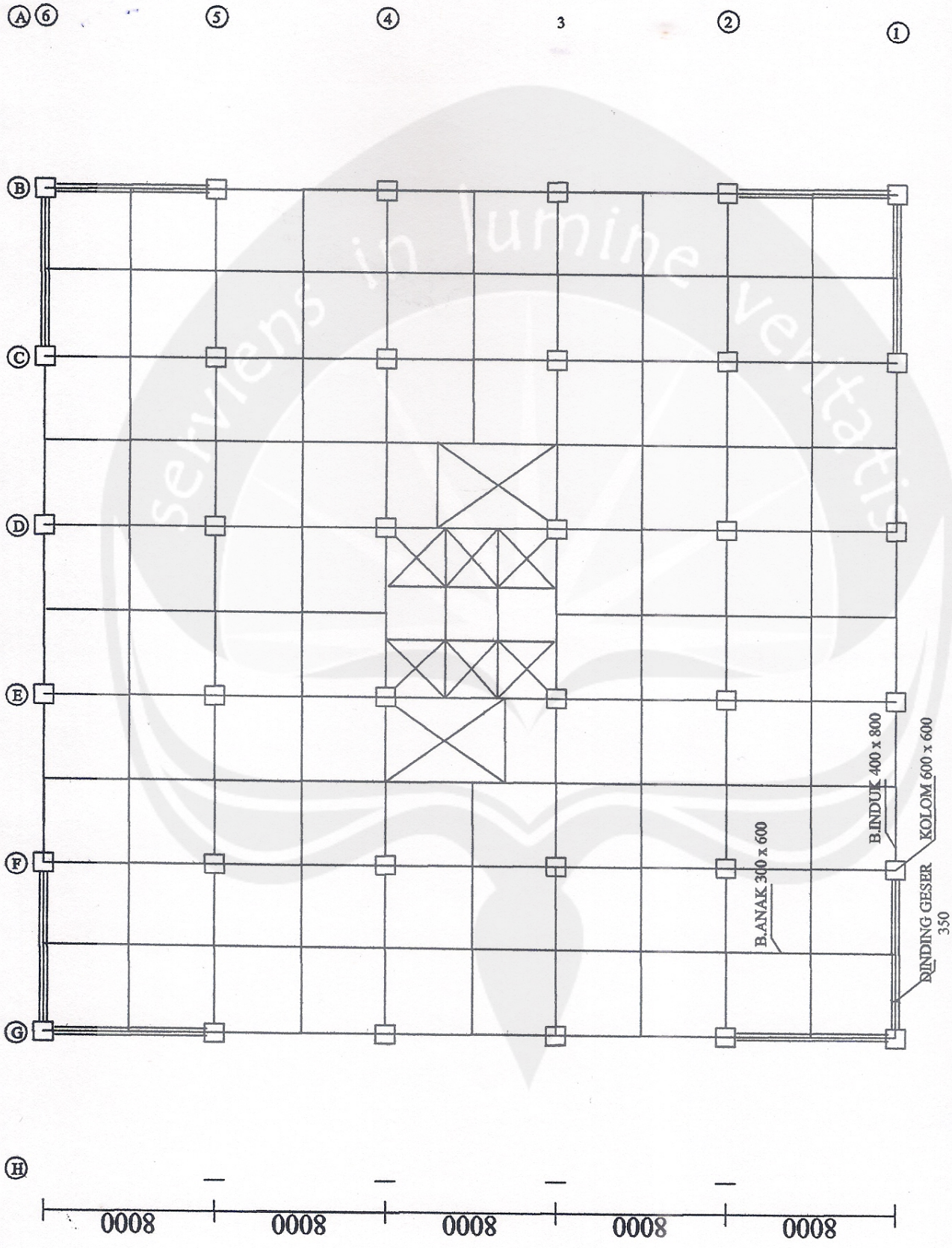
A.4. DENAH LANTAI 3 s/d LANTAI 4 (Skala 1:250)

(PT. CAKRA MANGGILINGAN JAYA)



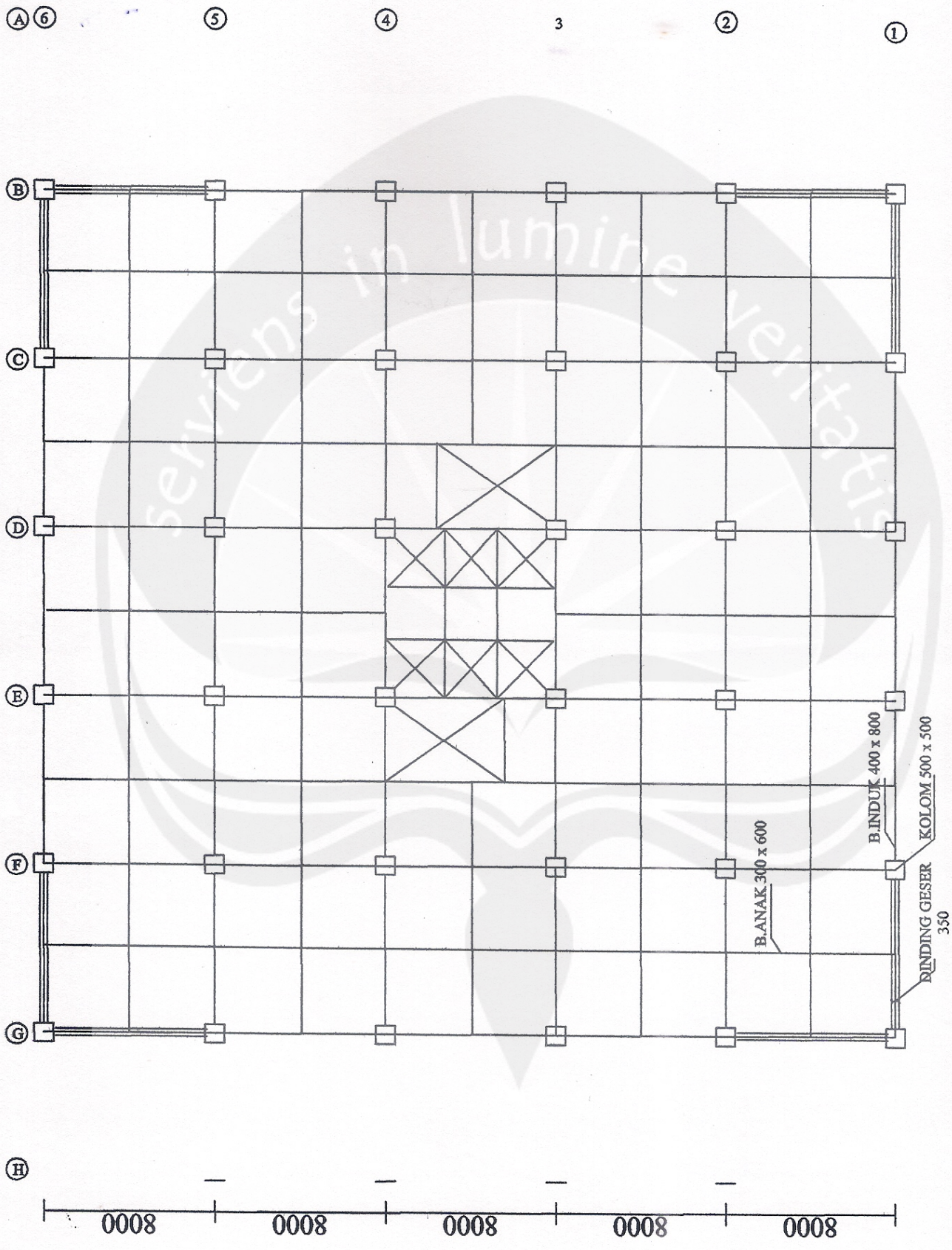
A.5. DENAH LANTAI 5 s/d LANTAI 6 (Skala 1:250)

(PT. CAKRA MANGGILINGAN JAYA)



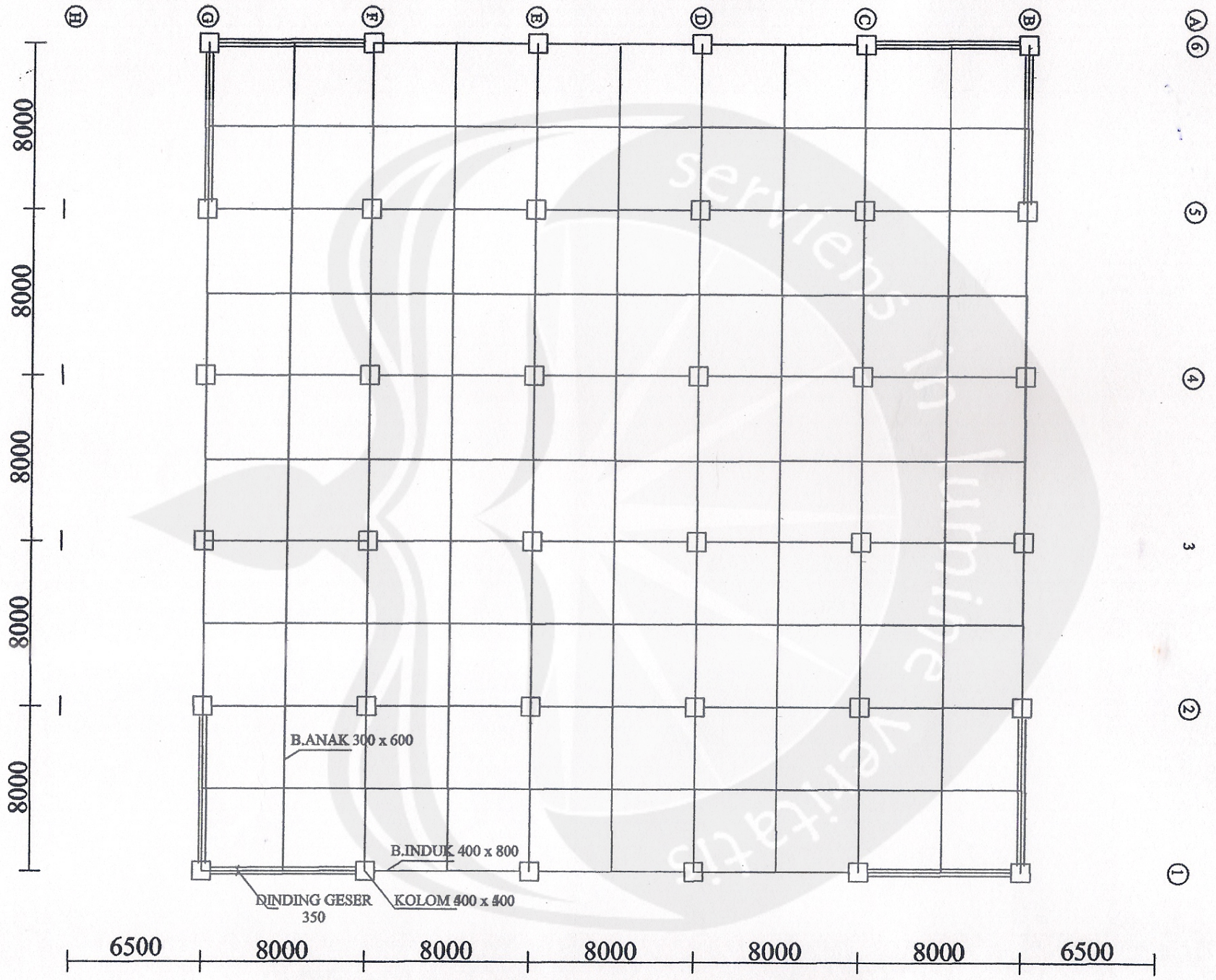
A.6. DENAH LANTAI 7 s/d LANTAI 8 (Skala 1:250)

(PT. CAKRA MANGGILINGAN JAYA)



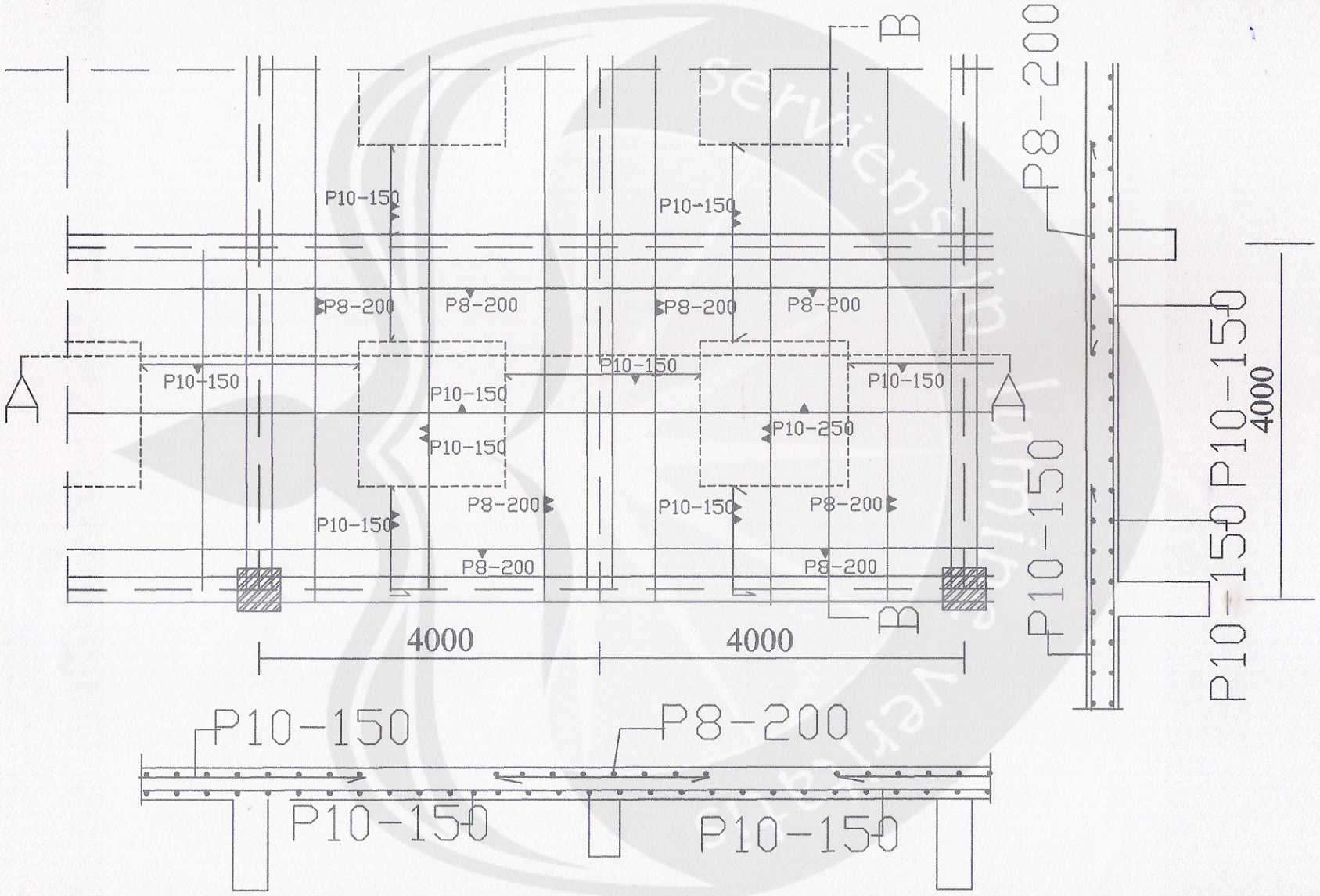
A.7. DENAH LANTAI 9 s/d LANTAI 10 (Skala 1:250)

(PT. CAKRA MANGGILINGAN JAYA)



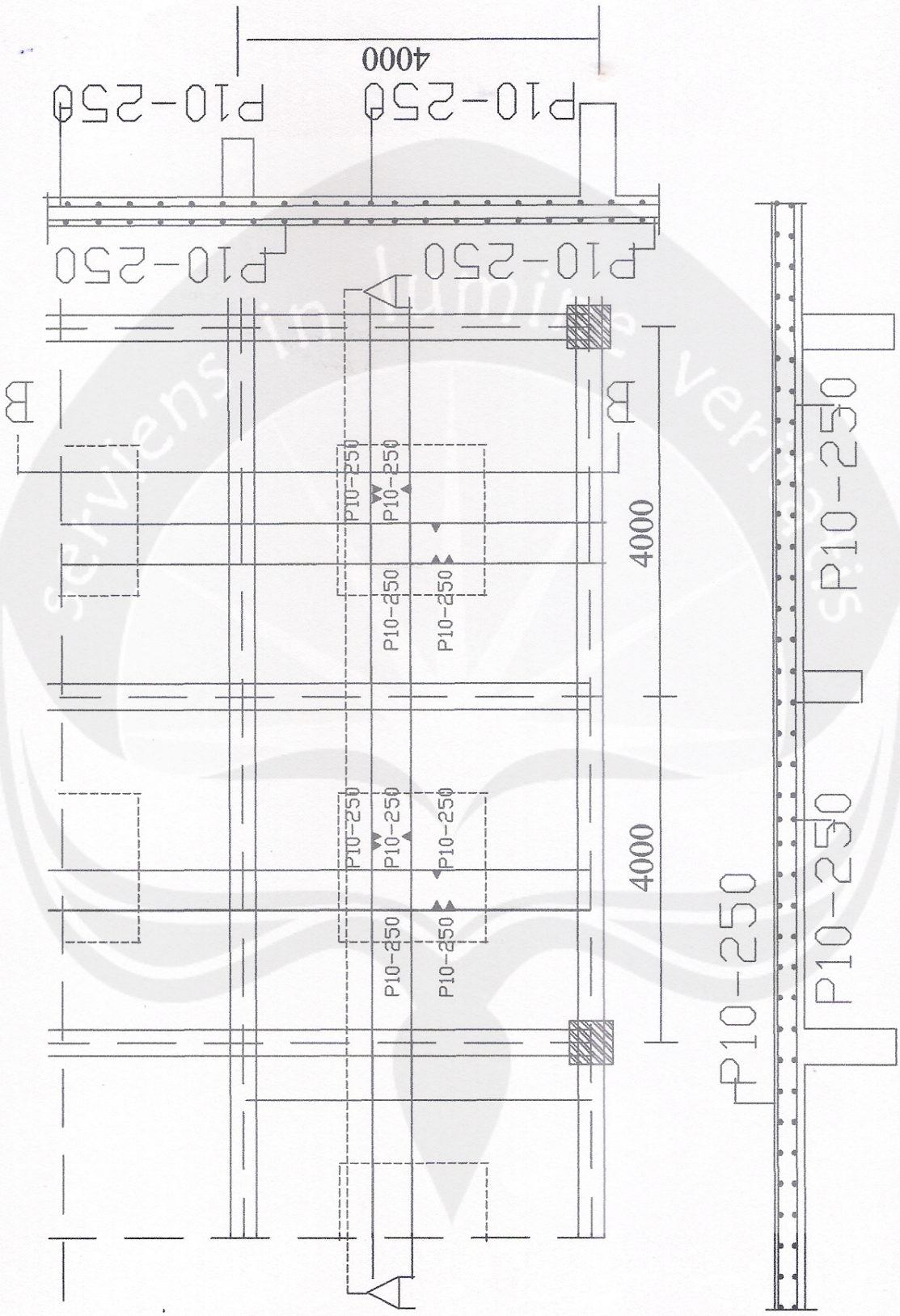
A.8. DENAH LANTAI 11 / ATAP (Skala 1:250)

(PT. CAKRA MANGGILINGAN JAYA)



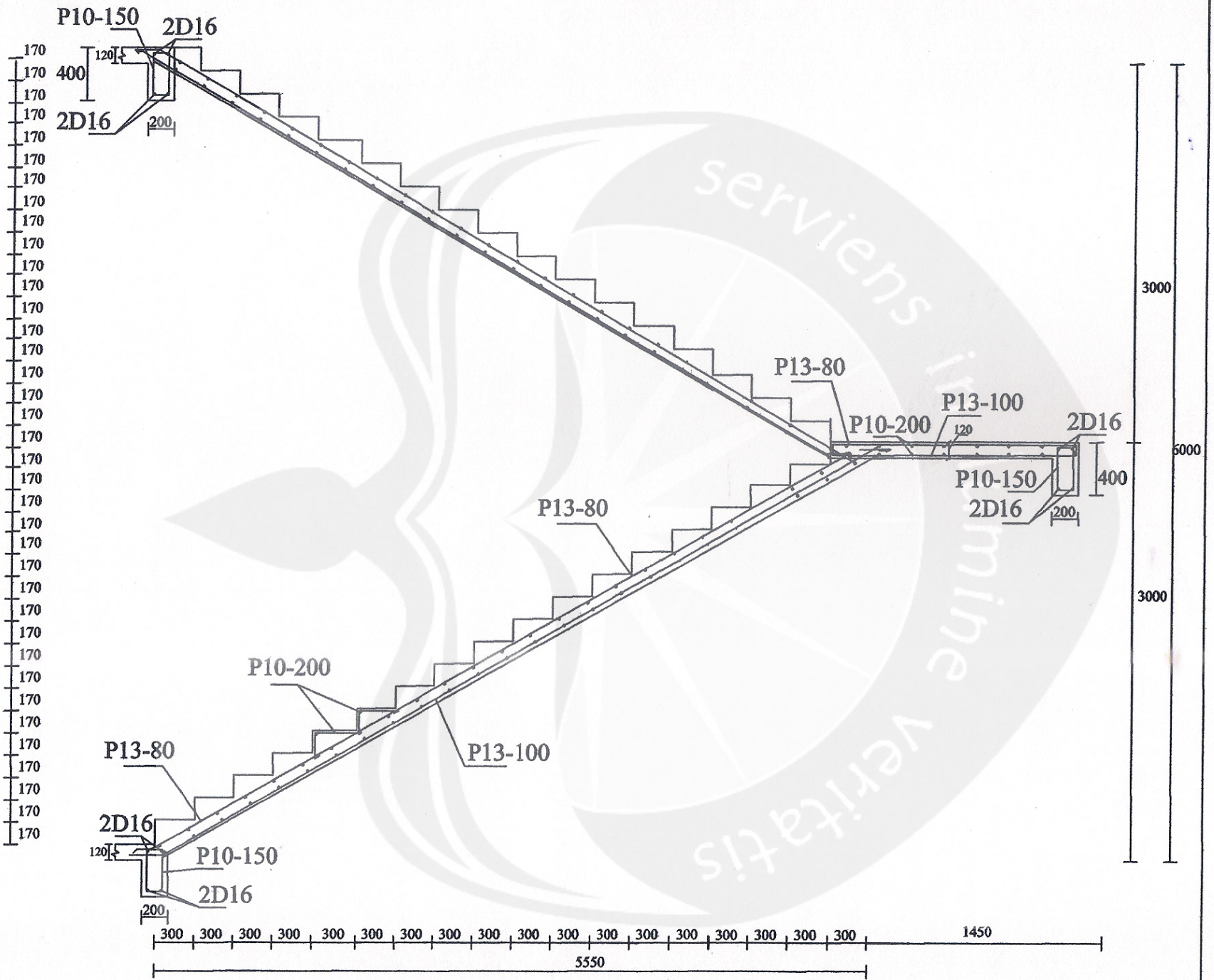
A.9. GAMBAR PENULANGAN PELAT LANTAI (Skala 1:250)

(PT. CAKRA MANGGILINGAN JAYA)



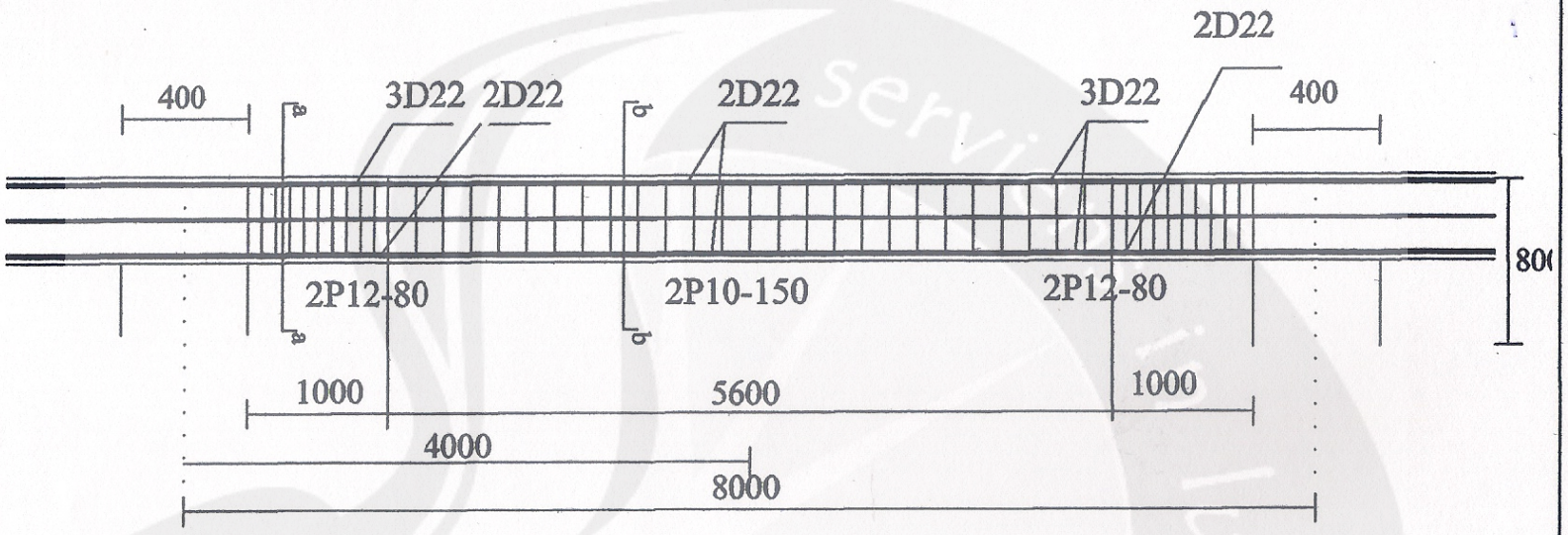
A.10. GAMBAR PENULANGAN PELAT ATAP (Skala 1:250)

(PT. CAKRA MANGGILINGAN JAYA)



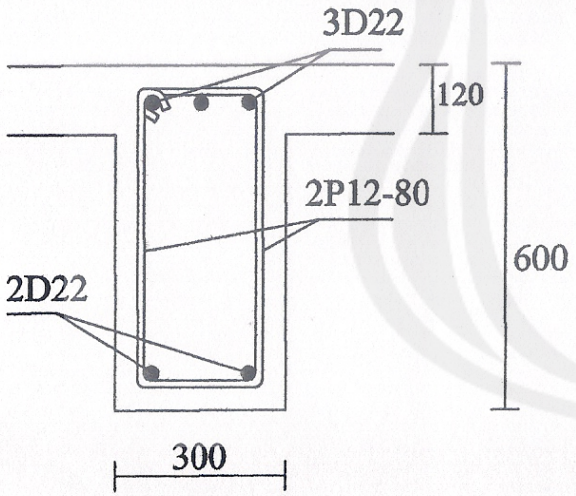
A.11. GAMBAR PENULANGAN PELAT TANGGA (Skala 1:250)

(PT. CAKRA MANGGILINGAN JAYA)

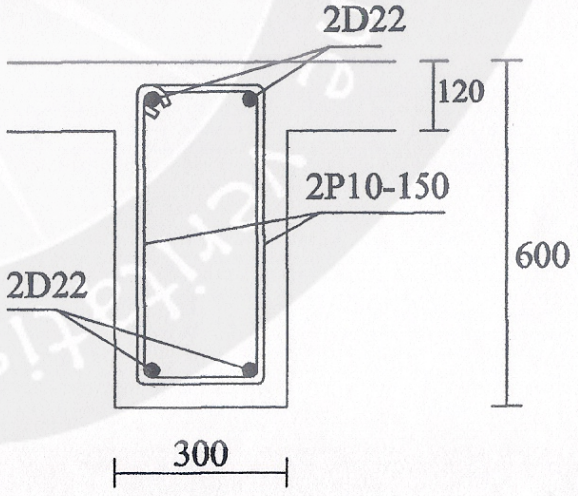


A.12. GAMBAR PENULANGAN BALOK ANAK EMPAT METER (Skala 1:50)

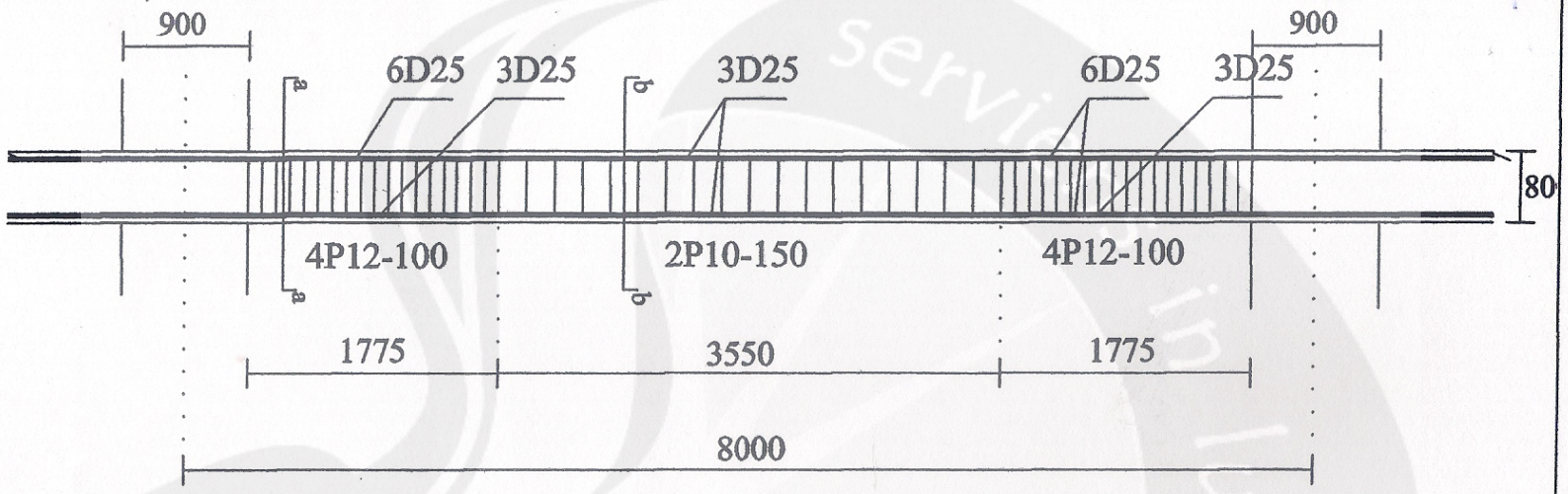
(PT. CAKRA MANGGILINGAN JAYA)



POTONGAN a-a
Skala 1:12,5

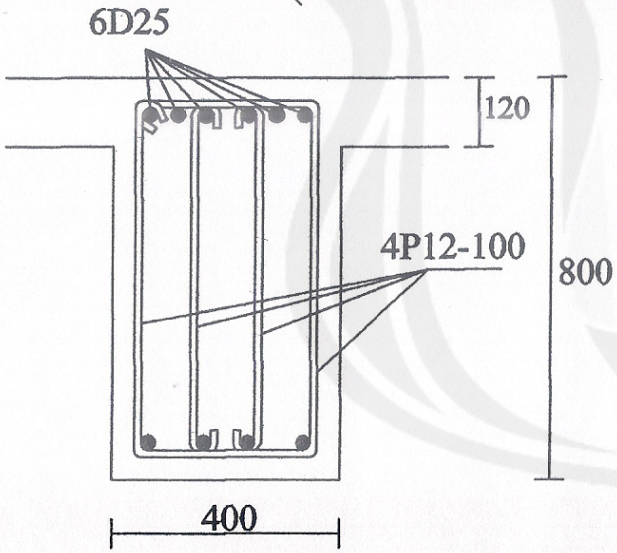


POTONGAN b-b
Skala 1:12,5

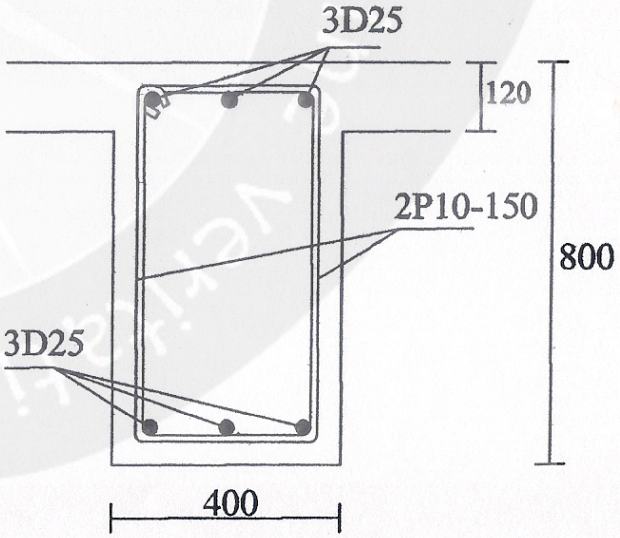


A.13. GAMBAR PENULANGAN BALOK INDUK DELAPAN METER (Skala 1:50)

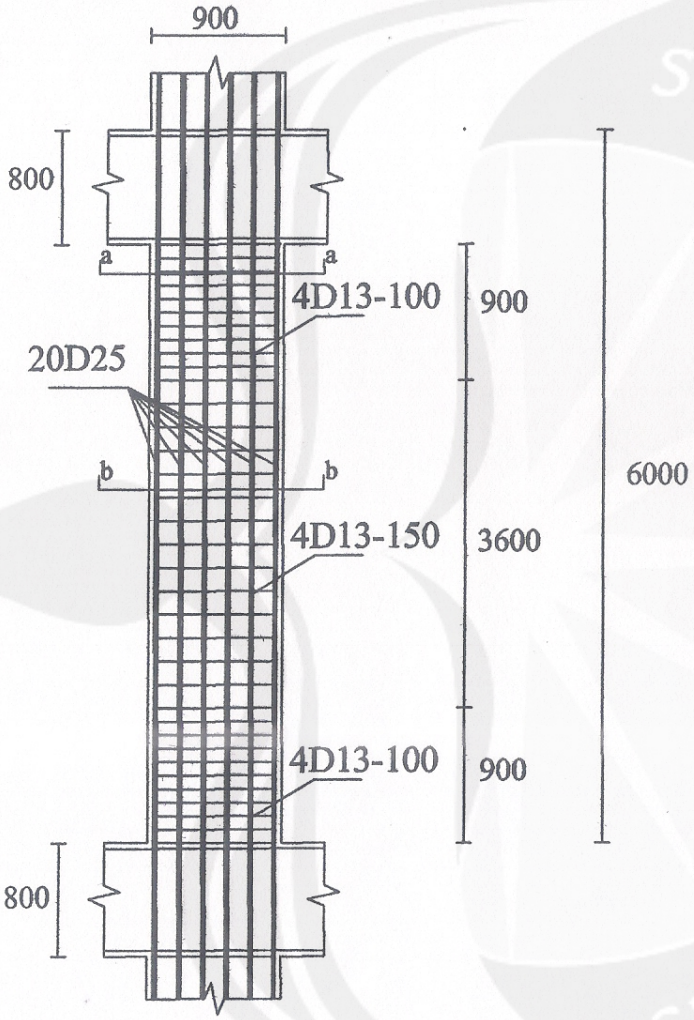
(PT. CAKRA MANGGILINGAN JAYA)

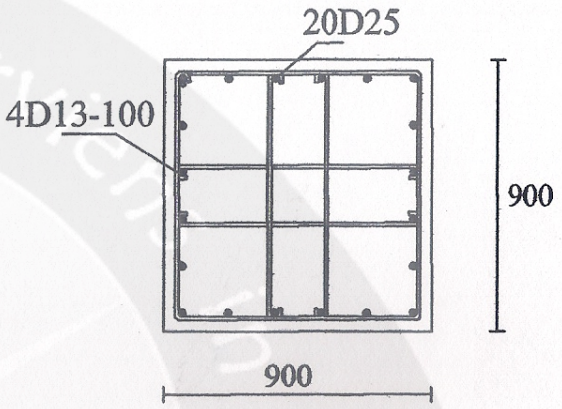


POTONGAN a-a
Skala 1:12,5

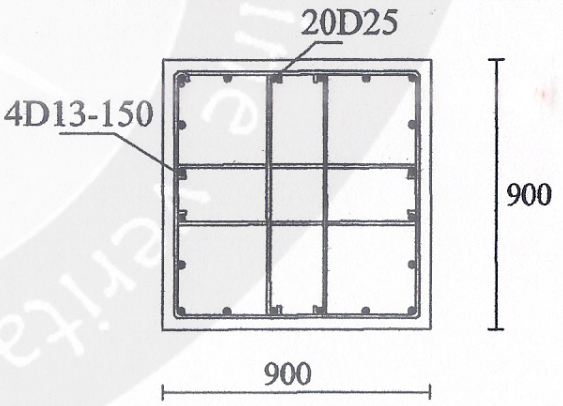


POTONGAN b-b
Skala 1:12,5





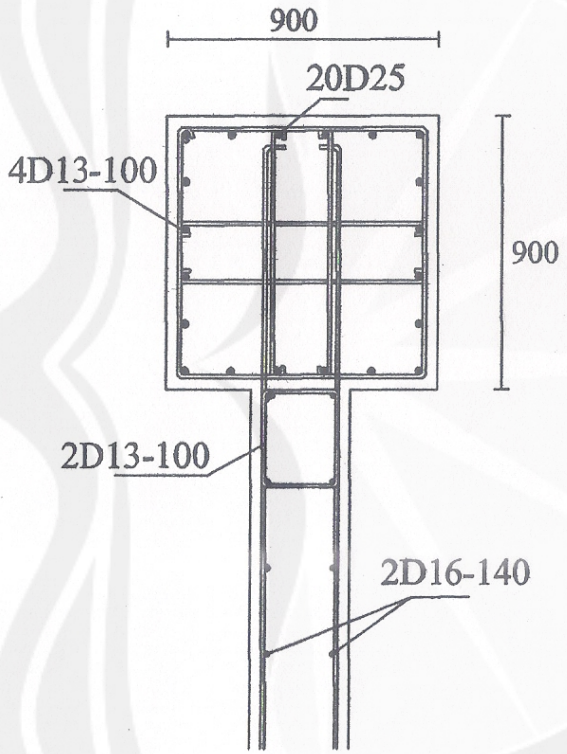
POTONGAN a-a
Skala 1:25



POTONGAN b-b
Skala 1:25

A.14. GAMBAR PENULANGAN KOLOM LT.2 (Skala 1:50)

(PT. CAKRA MANGGILINGAN JAYA)



A.15. GAMBAR PENULANGAN DINDING GESER (Skala 1:50)

(PT. CAKRA MANGGILINGAN JAYA)

LAMPIRAN B

B.1. *Input ETABS 9.0*
B.2. *Output ETABS 9.0*
B.3. *Concrete Design / Check of Structure*
B.4. Nomogram Komponen Struktur Bergoyang

Lampiran B.1. *Input ETABS 9.0*

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L O A D I N G C O M B I N A T I O N S

COMBO	COMBO TYPE	CASE	CASE TYPE	SCALE FACTOR
COMB1	ADD	DL	Static	1,4000
		SD	Static	1,4000
COMB2	ADD	DL	Static	1,2000
		SD	Static	1,2000
		LL	Static	1,6000
COMB3	ADD	DL	Static	1,2000
		SD	Static	1,2000
		LL	Static	1,0000
		EX	Static	1,0000
		EY	Static	0,3000
COMB4	ADD	DL	Static	1,2000
		SD	Static	1,2000
		LL	Static	1,0000
		EX	Static	-1,0000
		EY	Static	0,3000
COMB5	ADD	DL	Static	1,2000
		SD	Static	1,2000
		LL	Static	1,0000
		EX	Static	1,0000
		EY	Static	-0,3000
COMB6	ADD	DL	Static	1,2000
		SD	Static	1,2000
		LL	Static	1,0000
		EX	Static	-1,0000
		EY	Static	-0,3000
COMB7	ADD	DL	Static	1,2000
		SD	Static	1,2000
		LL	Static	1,0000

		EX	Static	0,3000
		EY	Static	1,0000
COMB8	ADD	DL	Static	1,2000
		SD	Static	1,2000
		LL	Static	1,0000
		EX	Static	-0,3000
		EY	Static	1,0000
COMB9	ADD	DL	Static	1,2000
		SD	Static	1,2000
		LL	Static	1,0000
		EX	Static	0,3000
		EY	Static	-1,0000
COMB10	ADD	DL	Static	1,2000
		SD	Static	1,2000
		LL	Static	1,0000
		EX	Static	-0,3000
		EY	Static	-1,0000
COMB11	ADD	DL	Static	0,9000
		SD	Static	0,9000
		EX	Static	1,0000
		EY	Static	0,3000
COMB12	ADD	DL	Static	0,9000
		SD	Static	0,9000
		EX	Static	-1,0000
		EY	Static	0,3000
COMB13	ADD	DL	Static	0,9000
		SD	Static	0,9000
		EX	Static	1,0000
		EY	Static	-0,3000
COMB14	ADD	DL	Static	0,9000
		SD	Static	0,9000
		EX	Static	-1,0000
		EY	Static	-0,3000
COMB15	ADD	DL	Static	0,9000
		SD	Static	0,9000
		EX	Static	0,3000

		EY	Static	1,0000
COMB16	ADD	DL	Static	0,9000
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		EX	Static	-0,3000
		EY	Static	1,0000
COMB17	ADD	DL	Static	0,9000
		SD	Static	0,9000
		EX	Static	0,3000
		EY	Static	-1,0000
COMB18	ADD	DL	Static	0,9000
		SD	Static	0,9000
		EX	Static	-0,3000
		EY	Static	-1,0000
ENVE	ENVE	COMB1	Combo	1,0000
		COMB2	Combo	1,0000
		COMB3	Combo	1,0000
		COMB4	Combo	1,0000
		COMB5	Combo	1,0000
		COMB6	Combo	1,0000
		COMB7	Combo	1,0000
		COMB8	Combo	1,0000
		COMB9	Combo	1,0000
		COMB10	Combo	1,0000
		COMB11	Combo	1,0000
		COMB12	Combo	1,0000
		COMB13	Combo	1,0000
		COMB14	Combo	1,0000
		COMB15	Combo	1,0000
		COMB16	Combo	1,0000
		COMB17	Combo	1,0000
		COMB18	Combo	1,0000
XLEFT	ENVE	COMB1	Combo	1,0000
		COMB2	Combo	1,0000
		COMB3	Combo	1,0000
		COMB5	Combo	1,0000
		COMB11	Combo	1,0000

		COMB13	Combo	1,0000
XRIGHT	ENVE	COMB1	Combo	1,0000
		COMB2	Combo	1,0000
		COMB4	Combo	1,0000
		COMB6	Combo	1,0000
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YLEFT	ENVE	COMB1	Combo	1,0000
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		COMB2	Combo	1,0000
		COMB9	Combo	1,0000
		COMB10	Combo	1,0000
		COMB17	Combo	1,0000
		COMB18	Combo	1,0000

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S T O R Y D A T A

STORY	SIMILAR TO	HEIGHT	ELEVATION
STORY11	None	4,000	48,000
STORY10	STORY11	4,000	44,000
STORY9	STORY11	4,000	40,000
STORY8	STORY11	4,000	36,000
STORY7	STORY11	4,000	32,000
STORY6	STORY11	4,000	28,000
STORY5	STORY11	4,000	24,000
STORY4	STORY11	4,000	20,000
STORY3	STORY11	4,000	16,000
STORY2	STORY11	6,000	12,000
STORY1	STORY11	6,000	6,000
BASE	None		0,000

S T A T I C L O A D C A S E S

STATIC CASE	CASE TYPE	AUTO LAT LOAD	SELF WT MULTIPLIER
DL	DEAD	N/A	1,0000
SD	SUPER DEAD	N/A	0,0000
LL	LIVE	N/A	0,0000
EX	QUAKE	USER	0,0000
EY	QUAKE	USER	0,0000

R E S P O N S E S P E C T R U M C A S E S

RESP SPEC CASE: SNI2002

BASIC RESPONSE SPECTRUM DATA

MODAL COMBO	DIRECTION COMBO	MODAL DAMPING	SPECTRUM ANGLE	TYPICAL ECCEN
CQC	SRSS	0,0500	0,0000	0,0000

RESPONSE SPECTRUM FUNCTION ASSIGNMENT DATA

DIRECTION	FUNCTION	SCALE FACT
U1	WG5LUNAK	1,15412
U2	WG5LUNAK	1,15412
UZ	WG5LUNAK	1,15412

M A S S S O U R C E D A T A

MASS	LATERAL	LUMP MASS
FROM	MASS ONLY	AT STORIES
Masses & Loa	Yes	Yes

M A S S S O U R C E L O A D S

LOAD	MULTIPLIER
DL	1,0000
LL	0,3000

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D I A P H R A G M M A S S D A T A

STORY	DIAPHRAGM	MASS-X	MASS-Y	MMI	X-M	Y-M
STORY11	D11	2239,8846	2239,8846	751910,7379	28,125	26,500
STORY10	D10	2595,0712	2595,0712	944586,8676	28,125	26,499
STORY9	D9	2626,1975	2626,1975	956207,3771	28,125	26,499
STORY8	D8	2655,0182	2655,0182	967360,6069	28,125	26,499
STORY7	D7	2693,0616	2693,0616	981563,4518	28,125	26,499
STORY6	D6	2728,7992	2728,7992	995299,0170	28,125	26,499
STORY5	D5	2773,7595	2773,75951012084,1975		28,125	26,500
STORY4	D4	3266,7042	3266,70421319084,1822		28,125	26,500
STORY3	D3	3382,0857	3382,08571385468,6257		28,125	26,500
STORY2	D2	3721,3630	3721,36301562057,6963		28,125	26,500
STORY1	D1	4072,0150	4072,01501743174,2312		28,125	26,500

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A S S E M B L E D P O I N T M A S S E S

STORY	UX	UY	UZ	RX	RY	RZ
STORY11	2302,341474	2302,341474	0,000000	0,000000	0,000000	751910,7379
STORY10	2595,071156	2595,071156	0,000000	0,000000	0,000000	944586,8676
STORY9	2626,197521	2626,197521	0,000000	0,000000	0,000000	956207,3771
STORY8	2655,018229	2655,018229	0,000000	0,000000	0,000000	967360,6069
STORY7	2693,061563	2693,061563	0,000000	0,000000	0,000000	981563,4518
STORY6	2728,799241	2728,799241	0,000000	0,000000	0,000000	995299,0170
STORY5	2773,759546	2773,759546	0,000000	0,000000	0,0000001012084,1975	
STORY4	3266,704220	3266,704220	0,000000	0,000000	0,0000001319084,1822	
STORY3	3382,085651	3382,085651	0,000000	0,000000	0,0000001385468,6257	
STORY2	3721,363027	3721,363027	0,000000	0,000000	0,0000001562057,6963	
STORY1	4072,014975	4072,014975	0,000000	0,000000	0,0000001743174,2312	
BASE	836,376949	836,376949	0,000000	0,000000	0,000000	0,000000
Totals	33652,79355	33652,79355	0,000000	0,000000	0,00000012618796,991	

Lampiran B.2. *Output ETABS 9.0*

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C E N T E R S O F C U M U L A T I V E M A S S & C E N T E R S O F R I G I D I T Y

STORY LEVEL	DIAPHRAGM NAME	/----------CENTER OF MASS----------//--CENTER OF RIGIDITY--/ MASS	ORDINATE-X	ORDINATE-Y	ORDINATE-X	ORDINATE-Y
STORY11	D11	2239,8846	28,125	26,500	28,125	26,500
STORY10	D10	2595,0712	28,125	26,499	28,125	26,500
STORY9	D9	2626,1975	28,125	26,499	28,125	26,500
STORY8	D8	2655,0182	28,125	26,499	28,125	26,500
STORY7	D7	2693,0616	28,125	26,499	28,125	26,500
STORY6	D6	2728,7992	28,125	26,499	28,125	26,500
STORY5	D5	2773,7595	28,125	26,500	28,125	26,500
STORY4	D4	3266,7042	28,125	26,500	28,125	26,500
STORY3	D3	3382,0857	28,125	26,500	28,125	26,500
STORY2	D2	3721,3630	28,125	26,500	28,125	26,500
STORY1	D1	4072,0150	28,125	26,500	28,125	26,500

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M O D A L P E R I O D S A N D F R E Q U E N C I E S

MODE NUMBER	PERIOD (TIME)	FREQUENCY (CYCLES/TIME)	CIRCULAR FREQ (RADIANS/TIME)
Mode 1	1,22079	0,81914	5,14680
Mode 2	1,21647	0,82205	5,16510
Mode 3	0,73341	1,36349	8,56705
Mode 4	0,31015	3,22426	20,25863
Mode 5	0,31000	3,22582	20,26841
Mode 6	0,18999	5,26332	33,07042
Mode 7	0,14118	7,08300	44,50379
Mode 8	0,14110	7,08737	44,53124
Mode 9	0,08843	11,30865	71,05436
Mode 10	0,08752	11,42560	71,78917
Mode 11	0,08746	11,43384	71,84093
Mode 12	0,06501	15,38223	96,64943
Mode 13	0,06498	15,38928	96,69373
Mode 14	0,05707	17,52218	110,09509
Mode 15	0,05284	18,92618	118,91670
Mode 16	0,05281	18,93463	118,96980
Mode 17	0,04443	22,50640	141,41186
Mode 18	0,04442	22,51211	141,44775
Mode 19	0,04365	22,90845	143,93805
Mode 20	0,03796	26,34582	165,53568
Mode 21	0,03794	26,35571	165,59779
Mode 22	0,03618	27,64059	173,67095

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M O D A L P A R T I C I P A T I N G M A S S R A T I O S

MODE NUMBER	X-TRANS %MASS <SUM>	Y-TRANS %MASS <SUM>	Z-TRANS %MASS <SUM>	RX-ROTN %MASS <SUM>	RY-ROTN %MASS <SUM>	RZ-ROTN %MASS <SUM>
Mode 1	0,00 < 0>	67,71 < 68>	0,00 < 0>	98,04 < 98>	0,01 < 0>	0,00 < 0>
Mode 2	67,68 < 68>	0,00 < 68>	0,00 < 0>	0,01 < 98>	98,03 < 98>	0,00 < 0>
Mode 3	0,00 < 68>	0,00 < 68>	0,00 < 0>	0,00 < 98>	0,00 < 98>	66,29 < 66>
Mode 4	0,01 < 68>	21,79 < 90>	0,00 < 0>	1,75 <100>	0,00 < 98>	0,00 < 66>
Mode 5	21,82 < 90>	0,01 < 90>	0,00 < 0>	0,00 <100>	1,77 <100>	0,00 < 66>
Mode 6	0,00 < 90>	0,00 < 90>	0,00 < 0>	0,00 <100>	0,00 <100>	24,17 < 90>
Mode 7	0,00 < 90>	5,60 < 95>	0,00 < 0>	0,16 <100>	0,00 <100>	0,00 < 90>
Mode 8	5,60 < 95>	0,00 < 95>	0,00 < 0>	0,00 <100>	0,16 <100>	0,00 < 90>
Mode 9	0,00 < 95>	0,00 < 95>	0,00 < 0>	0,00 <100>	0,00 <100>	5,41 < 96>
Mode 10	0,00 < 95>	2,61 < 98>	0,00 < 0>	0,03 <100>	0,00 <100>	0,00 < 96>
Mode 11	2,62 < 98>	0,00 < 98>	0,00 < 0>	0,00 <100>	0,02 <100>	0,00 < 96>
Mode 12	0,00 < 98>	1,50 < 99>	0,00 < 0>	0,01 <100>	0,00 <100>	0,00 < 96>
Mode 13	1,50 < 99>	0,00 < 99>	0,00 < 0>	0,00 <100>	0,01 <100>	0,00 < 96>
Mode 14	0,00 < 99>	0,00 < 99>	0,00 < 0>	0,00 <100>	0,00 <100>	2,59 < 98>
Mode 15	0,00 < 99>	0,63 <100>	0,00 < 0>	0,00 <100>	0,00 <100>	0,00 < 98>
Mode 16	0,63 <100>	0,00 <100>	0,00 < 0>	0,00 <100>	0,00 <100>	0,00 < 98>
Mode 17	0,00 <100>	0,12 <100>	0,00 < 0>	0,00 <100>	0,00 <100>	0,00 < 98>
Mode 18	0,11 <100>	0,00 <100>	0,00 < 0>	0,00 <100>	0,00 <100>	0,00 < 98>
Mode 19	0,00 <100>	0,00 <100>	0,00 < 0>	0,00 <100>	0,00 <100>	1,17 <100>
Mode 20	0,00 <100>	0,02 <100>	0,00 < 0>	0,00 <100>	0,00 <100>	0,00 <100>
Mode 21	0,02 <100>	0,00 <100>	0,00 < 0>	0,00 <100>	0,00 <100>	0,00 <100>
Mode 22	0,00 <100>	0,00 <100>	0,00 < 0>	0,00 <100>	0,00 <100>	0,33 <100>

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M O D A L L O A D P A R T I C I P A T I O N R A T I O S
(STATIC AND DYNAMIC RATIOS ARE IN PERCENT)

TYPE	NAME	STATIC	DYNAMIC
Load	DL	0,0000	0,0000
Load	SD	0,0000	0,0000
Load	LL	0,0000	0,0000
Load	EX	100,0000	100,0000
Load	EY	100,0000	100,0000
Accel	UX	100,0000	99,9932
Accel	UY	100,0000	99,9931
Accel	UZ	0,0000	0,0000
Accel			

S T O R Y F O R C E S

STORY	LOAD	LOCATION	P	VX	VY	T	MX	MY
STORY11	SNI2002	Top	0,00	4711,03	4697,32	181768,034	0,000	0,000
		Bottom	0,00	4711,03	4697,32	181768,034	18789,278	18844,135
STORY10	SNI2002	Top	0,00	8861,29	8833,02	341850,432	18789,278	18844,135
		Bottom	0,00	8861,29	8833,02	341850,432	54035,942	54203,892
STORY9	SNI2002	Top	0,00	12088,92	12046,99	466298,852	54035,942	54203,892
		Bottom	0,00	12088,92	12046,99	466298,852	101838,251	102174,224
STORY8	SNI2002	Top	0,00	14631,60	14577,37	564306,253	101838,251	102174,224
		Bottom	0,00	14631,60	14577,37	564306,253	159167,095	159721,183
STORY7	SNI2002	Top	0,00	16733,36	16668,71	645313,936	159167,095	159721,183
		Bottom	0,00	16733,36	16668,71	645313,936	223930,838	224746,587
STORY6	SNI2002	Top	0,00	18574,35	18501,62	716291,739	223930,838	224746,587
		Bottom	0,00	18574,35	18501,62	716291,739	294789,826	295902,350
STORY5	SNI2002	Top	0,00	20271,85	20193,77	781780,040	294789,826	295902,350
		Bottom	0,00	20271,85	20193,77	781780,040	371006,637	372440,905
STORY4	SNI2002	Top	0,00	22131,49	22049,52	853562,579	371006,637	372440,905
		Bottom	0,00	22131,49	22049,52	853562,579	452718,101	454494,091
STORY3	SNI2002	Top	0,00	23885,11	23800,17	921266,786	452718,101	454494,091
		Bottom	0,00	23885,11	23800,17	921266,786	539848,265	541982,608
STORY2	SNI2002	Top	0,00	25486,27	25399,51	983101,938	539848,265	541982,608
		Bottom	0,00	25486,27	25399,51	983101,938	679455,100	682140,479
STORY1	SNI2002	Top	0,00	26319,12	26231,91	1015276,120	679455,100	682140,479
		Bottom	0,00	26319,12	26231,91	1015276,120	826087,594	829321,165

D I S P L A C E M E N T S A T D I A P H R A G M C E N T E R O F M A S S

STORY	DIAPHRAGM	LOAD	POINT	X	Y	UX	UY	RZ
STORY11	D11	SNI2002	937	28,125	26,500	0,0640	0,0644	0,00000
STORY10	D10	SNI2002	938	28,125	26,499	0,0579	0,0577	0,00000
STORY9	D9	SNI2002	939	28,125	26,499	0,0500	0,0509	0,00000
STORY8	D8	SNI2002	940	28,125	26,499	0,0416	0,0440	0,00000
STORY7	D7	SNI2002	941	28,125	26,499	0,0351	0,0370	0,00000
STORY6	D6	SNI2002	942	28,125	26,499	0,0288	0,0300	0,00000
STORY5	D5	SNI2002	943	28,125	26,500	0,0228	0,0245	0,00000
STORY4	D4	SNI2002	944	28,125	26,500	0,0182	0,0183	0,00000
STORY3	D3	SNI2002	945	28,125	26,500	0,0129	0,0129	0,00000
STORY2	D2	SNI2002	946	28,125	26,500	0,0082	0,0082	0,00000
STORY1	D1	SNI2002	947	28,125	26,2500	0,0028	0,0028	0,00000

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L O A D I N G C O M B I N A T I O N S

COMBO	COMBO TYPE	CASE	CASE TYPE	SCALE FACTOR
ENVE	ENVE	COMB1	Combo	1,0000
		COMB2	Combo	1,0000
		COMB3	Combo	1,0000
		COMB4	Combo	1,0000
		COMB5	Combo	1,0000
		COMB6	Combo	1,0000
		COMB7	Combo	1,0000
		COMB8	Combo	1,0000
		COMB9	Combo	1,0000
		COMB10	Combo	1,0000
		COMB11	Combo	1,0000
		COMB12	Combo	1,0000
		COMB13	Combo	1,0000
		COMB14	Combo	1,0000
		COMB15	Combo	1,0000
		COMB16	Combo	1,0000
		COMB17	Combo	1,0000
		COMB18	Combo	1,0000

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B E A M F O R C E S

STORY	BEAM	LOAD	LOC	P	V2	V3	T	M2	M3
STORY2	B7	ENVE MAX							
			0,0000	0,00	-46,71	0,00	1,897	0,000	-57,479
			0,5000	0,00	-43,78	0,00	1,897	0,000	-34,606
			1,0000	0,00	-38,81	0,00	1,897	0,000	-13,708

			1,5000	0,00	-31,80	0,00	1,897	0,000	4,194
			2,0000	0,00	-22,74	0,00	1,897	0,000	19,473
			2,5000	0,00	-13,69	0,00	1,897	0,000	38,235
			3,0000	0,00	-6,68	0,00	1,897	0,000	51,276
			3,5000	0,00	-1,70	0,00	1,897	0,000	59,072
			4,0000	0,00	1,22	0,00	1,897	0,000	63,610
STORY2	B7	ENVE MIN							
			0,0000	0,00	-105,32	0,00	-11,434	0,000	-183,503
			0,5000	0,00	-100,41	0,00	-11,434	0,000	-135,259
			1,0000	0,00	-90,78	0,00	-11,434	0,000	-90,273
			1,5000	0,00	-76,43	0,00	-11,434	0,000	-50,532
			2,0000	0,00	-57,36	0,00	-11,434	0,000	-19,415
			2,5000	0,00	-40,35	0,00	-11,434	0,000	-5,034
			3,0000	0,00	-27,87	0,00	-11,434	0,000	3,822
			3,5000	0,00	-19,37	0,00	-11,434	0,000	9,681
			4,0000	0,00	-14,84	0,00	-11,434	0,000	13,565
STORY2	B59	ENVE MAX							
			0,4500	0,00	-10,21	0,00	18,514	0,000	264,280
			0,8938	0,00	-0,77	0,00	18,514	0,000	266,775
			1,3375	0,00	10,28	0,00	18,514	0,000	264,724
			1,7813	0,00	22,89	0,00	18,514	0,000	257,416
			2,2250	0,00	36,26	0,00	18,514	0,000	254,204
			2,6688	0,00	48,85	0,00	18,514	0,000	262,247
			3,1125	0,00	59,87	0,00	18,514	0,000	261,984
			3,5563	0,00	69,29	0,00	18,514	0,000	257,282
			4,0000	0,00	77,10	0,00	18,514	0,000	287,385
			4,0000	0,00	177,89	0,00	31,687	0,000	281,348
			4,4438	0,00	188,79	0,00	31,687	0,000	274,574
			4,8875	0,00	202,83	0,00	31,687	0,000	293,827
			5,3313	0,00	219,99	0,00	31,687	0,000	306,159
			5,7750	0,00	240,19	0,00	31,687	0,000	310,186
			6,2188	0,00	261,92	0,00	31,687	0,000	304,810
			6,6625	0,00	282,15	0,00	31,687	0,000	301,835
			7,1063	0,00	299,36	0,00	31,687	0,000	308,440
			7,5500	0,00	313,44	0,00	31,687	0,000	310,500
STORY2	B59	ENVE MIN							
			0,4500	0,00	-377,23	0,00	-33,294	0,000	-815,543
			0,8938	0,00	-363,15	0,00	-33,294	0,000	-651,156
			1,3375	0,00	-345,94	0,00	-33,294	0,000	-493,710
			1,7813	0,00	-325,71	0,00	-33,294	0,000	-344,589

2,2250	0,00	-303,98	0,00	-33,294	0,000	-214,790
2,6688	0,00	-283,78	0,00	-33,294	0,000	-111,458
3,1125	0,00	-266,62	0,00	-33,294	0,000	-13,374
3,5563	0,00	-252,58	0,00	-33,294	0,000	77,693
4,0000	0,00	-241,68	0,00	-33,294	0,000	139,923
4,0000	0,00	-87,36	0,00	-16,593	0,000	141,880
4,4438	0,00	-79,55	0,00	-16,593	0,000	84,412
4,8875	0,00	-70,13	0,00	-16,593	0,000	11,654
5,3313	0,00	-59,11	0,00	-16,593	0,000	-65,639
5,7750	0,00	-46,52	0,00	-16,593	0,000	-148,179
6,2188	0,00	-33,15	0,00	-16,593	0,000	-236,529
6,6625	0,00	-20,54	0,00	-16,593	0,000	-342,508
7,1063	0,00	-9,49	0,00	-16,593	0,000	-471,647
7,5500	0,00	-0,06	0,00	-16,593	0,000	-607,728

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L O A D I N G C O M B I N A T I O N S

COMBO	COMBO TYPE	CASE	CASE TYPE	SCALE FACTOR
ENVE	ENVE	COMB1	Combo	1,0000
		COMB2	Combo	1,0000
		COMB3	Combo	1,0000
		COMB4	Combo	1,0000
		COMB5	Combo	1,0000
		COMB6	Combo	1,0000
		COMB7	Combo	1,0000
		COMB8	Combo	1,0000
		COMB9	Combo	1,0000
		COMB10	Combo	1,0000
		COMB11	Combo	1,0000
		COMB12	Combo	1,0000
		COMB13	Combo	1,0000
		COMB14	Combo	1,0000
		COMB15	Combo	1,0000
		COMB16	Combo	1,0000
		COMB17	Combo	1,0000
		COMB18	Combo	1,0000

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C O L U M N F O R C E S

STORY	COLUMN	LOAD	LOC	P	V2	V3	T	M2	M3
STORY2	C18	ENVE MAX							
			0,0000	-5416,19	118,15	134,47	-0,002	462,599	411,731
			2,6000	-5371,54	118,15	134,47	-0,002	112,967	104,541
			5,2000	-5326,88	118,15	134,47	-0,002	127,355	144,222

STORY2	C18	ENVE MIN						
			0,0000	-8946,38	-91,79	-84,30	-0,005	-311,024	-333,106
			2,6000	-8886,84	-91,79	-84,30	-0,005	-91,835	-94,442
			5,2000	-8827,30	-91,79	-84,30	-0,005	-236,666	-202,650

ETABS Concrete Design

Engineer
Project DESAIN 1
Subject

ACI 318-99 COLUMN SECTION DESIGN Type: Sway Special Units: KN-m (Summary)

Level	: STORY1	L=6,000		
Element	: C3	B=0,900	D=0,900	dc=0,046
Station Loc	: 0,000	E=23500000,00	fc=25000,000	Lt.Wt. Fac.=1,000
Section ID	: K90X90	fy=400000,000	fys=240000,000	
Combo ID	: ENVE	RLLF=0,400		

Phi(Compression-Spiral):	0,700	Overstrength Factor:	1,25
Phi(Compression-Tied):	0,650		
Phi(Tension):	0,800		
Phi(Bending):	0,800		
Phi(Shear/Torsion):	0,750		

AXIAL FORCE & BIAXIAL MOMENT DESIGN FOR PU, M2, M3

	Rebar Area	Design Pu	Design M2	Design M3	Minimum M2	Minimum M3
	O/S #2	1599,334	3208,169	3287,959	67,556	67,556

AXIAL FORCE & BIAXIAL MOMENT FACTORS

	Cm Factor	Delta_ns Factor	Delta_s Factor	K Factor	L Length
Major Bending(M3)	1,000	1,012	1,000	1,000	5,400
Minor Bending(M2)	1,000	1,012	1,000	1,000	5,400

SHEAR DESIGN FOR V2,V3

	Design Rebar	Shear Vu	Shear phi*Vc	Shear phi*Vs	Shear Vp
Major Shear(V2)	0,001	522,650	830,121	198,794	0,000
Minor Shear(V3)	0,001	499,196	830,121	198,794	0,000

JOINT SHEAR DESIGN

	Joint Shear Ratio	Shear VuTop	Shear VuTot	Shear phi*Vc	Joint Area
Major Shear(V2)	N/A	N/A	N/A	N/A	N/A
Minor Shear(V3)	N/A	N/A	N/A	N/A	N/A

(6/5) BEAM/COLUMN CAPACITY RATIOS

Major Ratio	Minor Ratio
N/A	N/A

O/S #2 Reinforcing required exceeds maximum allowed

Notes:
N/A: Not Applicable
N/C: Not Calculated
N/N: Not Needed

ETABS Concrete Design

Engineer _____
Project DESAIN 1
Subject _____

ACI 318-99 BEAM SECTION DESIGN Type: Sway Special Units: KN-m (Summary)

Level	: STORY1	L=8,000		
Element	: B3	D=0,600	B=0,350	bf=0,350
Station Loc	: 7,550	ds=0,000	dct=0,040	dcb=0,040
Section ID	: B35X60	E=23500000,00	fc=25000,000	Lt.Wt. Fac.=1,000
Combo ID	: ENVE	fy=400000,000	fys=240000,000	

Phi(Bending): 0,800
Phi(Shear): 0,750
Phi(Torsion): 0,750

Design Moments, M3

	Positive Moment	Negative Moment	Special +Moment	Special -Moment
	658,051	-934,202	658,051	-934,202

Flexural Reinforcement for Moment, M3

	Required Rebar	+Moment Rebar	-Moment Rebar	Minimum Rebar
Top (+2 Axis)	O/S #2	O/S #2	O/S #2	6,757E-04
Bottom (-2 Axis)	0,004	0,004	0,002	6,757E-04

Shear Reinforcement for Shear, V2

Design Rebar	Shear Vu	Shear phi*Vc	Shear phi*Vs	Shear Vp
0,000	0,000	0,000	0,000	0,000

Reinforcement for Torsion, T

Rebar At	Rebar Al	Torsion Tu	Critical Phi*Tcr	Area Ao	Perimeter Ph
0,002	0,002	78,831	7,227	0,113	1,544

O/S #2 Reinforcing required exceeds maximum allowed

ACI 318-99 COLUMN SECTION DESIGN Type: Sway Special Units: KN-m (Summary)

Level	: STORY1	L=6,000		
Element	: C3	B=0,900	D=0,900	dc=0,046
Station Loc	: 0,000	E=23500000,00	fc=25000,000	Lt.Wt. Fac.=1,000
Section ID	: K90X90	fy=400000,000	fys=240000,000	
Combo ID	: ENVE	RLLF=0,400		

Phi(Compression-Spiral):	0,700	Overstrength Factor: 1,25
Phi(Compression-Tied):	0,650	
Phi(Tension):	0,800	
Phi(Bending):	0,800	
Phi(Shear/Torsion):	0,750	

AXIAL FORCE & BIAXIAL MOMENT DESIGN FOR PU, M2, M3

	Rebar Area	Design Pu	Design M2	Design M3	Minimum M2	Minimum M3
	O/S #2	1632,085	3258,219	3343,727	68,939	68,939

AXIAL FORCE & BIAXIAL MOMENT FACTORS

	Cm Factor	Delta_ns Factor	Delta_s Factor	K Factor	L Length
Major Bending(M3)	1,000	1,013	1,000	1,000	5,400
Minor Bending(M2)	1,000	1,013	1,000	1,000	5,400

SHEAR DESIGN FOR V2,V3

	Design Rebar	Shear Vu	Shear phi*Vc	Shear phi*Vs	Shear Vp
Major Shear(V2)	0,001	532,083	834,561	198,794	0,000
Minor Shear(V3)	0,001	506,416	834,561	198,794	0,000

JOINT SHEAR DESIGN

	Joint Shear Ratio	Shear VuTop	Shear VuTot	Shear phi*Vc	Joint Area
Major Shear(V2)	N/A	N/A	N/A	N/A	N/A
Minor Shear(V3)	N/A	N/A	N/A	N/A	N/A

(6/5) BEAM/COLUMN CAPACITY RATIOS

	Major Ratio	Minor Ratio
	N/A	N/A

O/S #2 Reinforcing required exceeds maximum allowed

Notes:
N/A: Not Applicable
N/C: Not Calculated
N/N: Not Needed

ACI 318-99 BEAM SECTION DESIGN Type: Sway Special Units: KN-m (Summary)

Level	: STORY1	L=8,000		
Element	: B3	D=0,600	B=0,350	bf=0,350
Station Loc	: 7,550	ds=0,000	dct=0,040	dcb=0,040
Section ID	: B35X60	E=23500000,00	fc=25000,000	Lt.Wt. Fac.=1,000
Combo ID	: ENVE	fy=400000,000	fys=240000,000	

Phi(Bending): 0,800
Phi(Shear): 0,750
Phi(Torsion): 0,750

Design Moments, M3

	Positive Moment	Negative Moment	Special +Moment	Special -Moment
	669,891	-946,033	669,891	-946,033

Flexural Reinforcement for Moment, M3

	Required Rebar	+Moment Rebar	-Moment Rebar	Minimum Rebar
Top (+2 Axis)	O/S #2	O/S #2	O/S #2	6,757E-04
Bottom (-2 Axis)	0,005	0,005	0,002	6,757E-04

Shear Reinforcement for Shear, V2

Design Rebar	Shear Vu	Shear phi*Vc	Shear phi*Vs	Shear Vp
0,000	0,000	0,000	0,000	0,000

Reinforcement for Torsion, T

Rebar At	Rebar Al	Torsion Tu	Critical Phi*Tcr	Area Ao	Perimeter Ph
0,002	0,002	79,524	7,227	0,113	1,544

O/S #2 Reinforcing required exceeds maximum allowed

ETABS Concrete Design

Engineer _____
Project DESAIN 3
Subject _____

ACI 318-99 COLUMN SECTION DESIGN Type: Sway Special Units: KN-m (Summary)

Level	: STORY1	L=6,000		
Element	: C3	B=0,900	D=0,900	dc=0,046
Station Loc	: 0,000	E=23500000,00	fc=25000,000	Lt.Wt. Fac.=1,000
Section ID	: K90X90	fy=400000,000	fys=240000,000	
Combo ID	: ENVE	RLLF=0,400		

Phi(Compression-Spiral):	0,700	Overstrength Factor:	1,25
Phi(Compression-Tied):	0,650		
Phi(Tension):	0,800		
Phi(Bending):	0,800		
Phi(Shear/Torsion):	0,750		

AXIAL FORCE & BIAXIAL MOMENT DESIGN FOR PU, M2, M3

	Rebar Area	Design Pu	Design M2	Design M3	Minimum M2	Minimum M3
	O/S #2	1502,983	2818,433	3046,376	63,486	63,486

AXIAL FORCE & BIAXIAL MOMENT FACTORS

	Cm Factor	Delta_ns Factor	Delta_s Factor	K Factor	L Length
Major Bending(M3)	1,000	1,011	1,000	1,000	5,200
Minor Bending(M2)	1,000	1,011	1,000	1,000	5,200

SHEAR DESIGN FOR V2,V3

	Design Rebar	Shear Vu	Shear phi*Vc	Shear phi*Vs	Shear Vp
Major Shear(V2)	0,001	754,238	543,252	210,986	754,238
Minor Shear(V3)	0,001	624,100	923,488	198,794	449,762

JOINT SHEAR DESIGN

	Joint Shear Ratio	Shear VuTop	Shear VuTot	Shear phi*Vc	Joint Area
Major Shear(V2)	N/A	N/A	N/A	N/A	N/A
Minor Shear(V3)	N/A	N/A	N/A	N/A	N/A

(6/5) BEAM/COLUMN CAPACITY RATIOS

Major Ratio	Minor Ratio
N/A	N/A

O/S #2 Reinforcing required exceeds maximum allowed

Notes:
N/A: Not Applicable
N/C: Not Calculated
N/N: Not Needed

ETABS Concrete Design

Engineer _____
Project DESAIN 3
Subject _____

ACI 318-99 BEAM SECTION DESIGN Type: Sway Special Units: KN-m (Summary)

Level	: STORY1	L=8,000		
Element	: B3	D=0,800	B=0,500	bf=0,500
Station Loc	: 7,550	ds=0,000	dct=0,040	dcb=0,040
Section ID	: B50X80	E=23500000,00	fc=25000,000	Lt.Wt. Fac.=1,000
Combo ID	: ENVE	fy=400000,000	fys=240000,000	

Phi(Bending): 0,800
Phi(Shear): 0,750
Phi(Torsion): 0,750

Design Moments, M3

Positive Moment	Negative Moment	Special +Moment	Special -Moment
1274,936	-1598,381	1274,936	-1598,381

Flexural Reinforcement for Moment, M3

	Required Rebar	+Moment Rebar	-Moment Rebar	Minimum Rebar
Top (+2 Axis)	0,008	0,000	0,008	0,001
Bottom (-2 Axis)	0,006	0,006	3,655E-04	0,001

Shear Reinforcement for Shear, V2

Design Rebar	Shear Vu	Shear phi*Vc	Shear phi*Vs	Shear Vp
O/S #3	637,940	0,000	637,940	637,940

Reinforcement for Torsion, T

Rebar At	Rebar Al	Torsion Tu	Critical Phi*Tcr	Area Ao	Perimeter Ph
0,002	0,002	148,404	19,162	0,248	2,244

O/S #3 Shear stress exceeds maximum allowed

ETABS Concrete Design

Engineer
Project DESAIN 4
Subject

ACI 318-99 COLUMN SECTION DESIGN Type: Sway Special Units: KN-m (Summary)

Level	: STORY2	L=6,000		
Element	: C18	B=0,900	D=0,900	dc=0,046
Station Loc	: 5,200	E=23500000,00	fc=25000,000	Lt.Wt. Fac.=1,000
Section ID	: K90X90	fy=400000,000	fys=240000,000	
Combo ID	: ENVE	RLLF=0,400		

Phi(Compression-Spiral):	0,700	Overstrength Factor:	1,25
Phi(Compression-Tied):	0,650		
Phi(Tension):	0,800		
Phi(Bending):	0,800		
Phi(Shear/Torsion):	0,750		

AXIAL FORCE & BIAXIAL MOMENT DESIGN FOR PU, M2, M3

Rebar Area	Design Pu	Design M2	Design M3	Minimum M2	Minimum M3
0,008	8827,300	397,825	153,877	372,865	372,865

AXIAL FORCE & BIAXIAL MOMENT FACTORS

	Cm Factor	Delta_ns Factor	Delta_s Factor	K Factor	L Length
Major Bending(M3)	1,000	1,067	1,000	1,000	5,200
Minor Bending(M2)	1,000	1,067	1,000	1,000	5,200

SHEAR DESIGN FOR V2,V3

	Design Rebar	Shear Vu	Shear phi*Vc	Shear phi*Vs	Shear Vp
Major Shear(V2)	0,000	233,324	857,236	0,000	233,324
Minor Shear(V3)	0,000	240,695	857,236	0,000	240,695

JOINT SHEAR DESIGN

	Joint Shear Ratio	Shear VuTop	Shear VuTot	Shear phi*Vc	Joint Area
Major Shear(V2)	0,470	233,324	1422,021	3026,614	0,810
Minor Shear(V3)	0,487	240,695	1473,765	3026,614	0,810

(6/5) BEAM/COLUMN CAPACITY RATIOS

Major Ratio	Minor Ratio
0,248	0,256

ETABS Concrete Design

Engineer _____
Project DESAIN 9
Subject _____

ACI 318-99 BEAM SECTION DESIGN Type: Sway Special Units: KN-m (Summary)

Level	: STORY1	L=8,000		
Element	: B59	D=0,800	B=0,400	bf=0,400
Station Loc	: 0,450	ds=0,000	dct=0,040	dcb=0,040
Section ID	: B40X80	E=23500000,00	fc=25000,000	Lt.Wt. Fac.=1,000
Combo ID	: ENVE	fy=400000,000	fys=240000,000	

Phi(Bending): 0,800
Phi(Shear): 0,750
Phi(Torsion): 0,750

Design Moments, M3

	Positive Moment	Negative Moment	Special +Moment	Special -Moment
	309,500	-619,001	309,500	-619,001

Flexural Reinforcement for Moment, M3

	Required Rebar	+Moment Rebar	-Moment Rebar	Minimum Rebar
Top (+2 Axis)	0,003	0,000	0,003	0,001
Bottom (-2 Axis)	0,001	0,001	0,000	0,001

Shear Reinforcement for Shear, V2

Design Rebar	Shear Vu	Shear phi*Vc	Shear phi*Vs	Shear Vp
0,001	189,413	0,000	189,413	189,413

Reinforcement for Torsion, T

Rebar At	Rebar Al	Torsion Tu	Critical Phi*Tcr	Area Ao	Perimeter Ph
3,353E-04	0,001	22,700	13,286	0,188	2,044

ETABS Concrete Design

Engineer
Project DESAIN 4
Subject

ACI 318-99 BEAM SECTION DESIGN Type: Sway Special Units: KN-m (Summary)

Level	: STORY1	L=4,000		
Element	: B7	D=0,600	B=0,300	bf=0,300
Station Loc	: 0,000	ds=0,000	dct=0,040	dcb=0,040
Section ID	: B30X60	E=23500000,00	fc=25000,000	Lt.Wt. Fac.=1,000
Combo ID	: ENVE	fy=400000,000	fys=240000,000	

Phi(Bending): 0,800
Phi(Shear): 0,750
Phi(Torsion): 0,750

Design Moments, M3

	Positive Moment	Negative Moment	Special +Moment	Special -Moment
	86,854	-173,707	86,854	-173,707

Flexural Reinforcement for Moment, M3

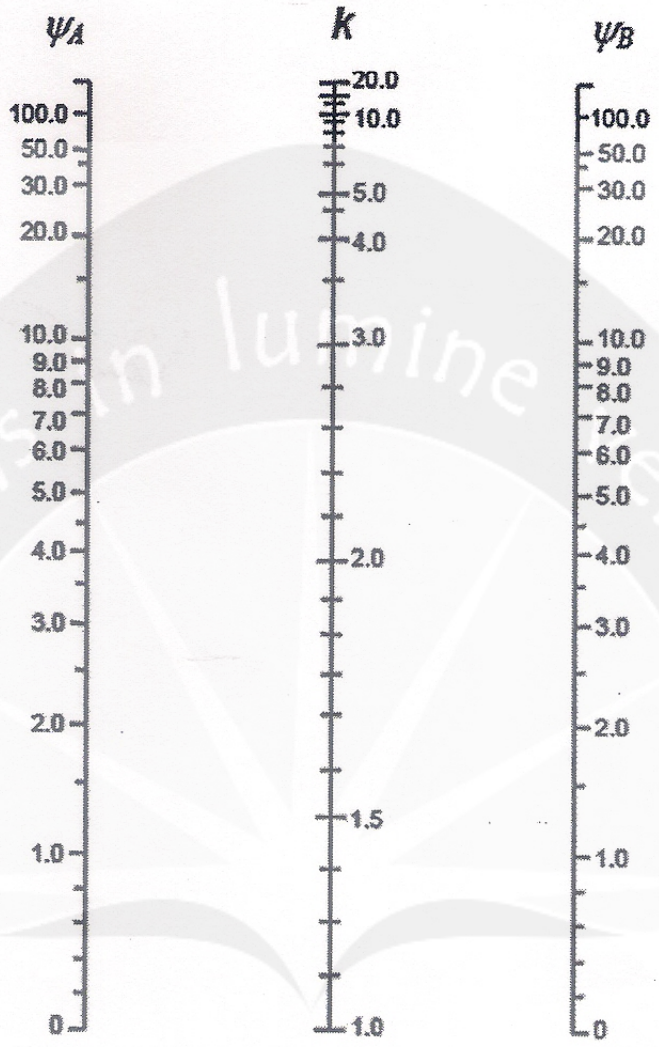
	Required Rebar	+Moment Rebar	-Moment Rebar	Minimum Rebar
Top (+2 Axis)	0,001	0,000	0,001	5,792E-04
Bottom (-2 Axis)	5,792E-04	4,986E-04	0,000	5,792E-04

Shear Reinforcement for Shear, V2

Design Rebar	Shear Vu	Shear phi*Vc	Shear phi*Vs	Shear Vp
9,751E-04	98,288	0,000	98,288	98,288

Reinforcement for Torsion, T

Rebar At	Rebar Al	Torsion Tu	Critical Phi*Tcr	Area Ao	Perimeter Ph
2,530E-04	7,149E-04	8,352	5,605	0,092	1,444



Komponen struktur bergoyang

(SNI 03-2847-2002 halaman 78)